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ABSTRACT

This study focuses on the production, dissemination, and assimilation of material published in the major journals on geography. The "core" journals selected for the study were: "Economic Geography," "Geographical Review," "Annals of AAG" and "Professional Geographer." The tangential journal included was: "Journal of Geography." The "core" journals are those which form the core of the journal literature and the "tangential" journal forms the periphery of this journal literature. This study traced the prepublication dissemination of the main content of the article, from the beginning of work by the author to the time of publication. In Part I, the following topics are discussed in detail: (1) background characteristics of the authors, (2) prepublication schedule of the work published, (3) scope and effect of prepublication reports, (4) submission of manuscripts to journals, (5) continuity of work in geography, and (6) availability of information contained in the journal article from secondary sources. The main body of the report deals with general findings, while each of the appendices deals with more detailed comparisons such as American and foreign authors (Appendix A) and articles published in the journals studied (Appendix B). The second study reported deals with the group of persons whom the authors in the journals studied cited as conducting work in the same subject-matter areas as those of their own articles. (NH)

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Center for Research in Scientific Communication

Department of Psychology

THE JOHNS HOPKINS UNIVERSITY

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JHU-CRSC Report #18 March 1971

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THE PRODUCTION, DISSEMINATION, AND ASSIMILATION OF INFORMATION CONTAINED IN JOURNAL ARTICLES IN GEOGRAPHY[1]

Since 1966 The Johns Hopkins University Center for Research in Scientific Communication, with the cooperation of nine scientific and engineering societies, has been studying the scientific and technical communication behavior of scientists and engineers. This program has involved the tracing, in real time, of the dissemination and assimilation of scientific or technological information generated by work begun in 1965 until it could be retrieved from secondary sources such as abstracts or review journals. The Association of American Geographers (AAG) represents one such cooperative society.

The first series of studies dealt with scientific information exchange associated with the 1967 annual meeting of the AAG because the national meeting usually represents the first "public" dissemination of a large portion of work produced in the field. This series consisted of three separate studies. The first study dealt with scientific information exchange at the meeting,[2] the second and third studies dealt with journal dissemination of the meeting material after

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[1]The work reported here was supported by the Research and Studies Section of the Office of Science Information Service of the National Science Foundation (NSF-GN 514). The members of the Center's Staff are William D. Garvey, Nan Lin, Carnot E. Nelson, Kazuo Tomita, and Molly Donker.

[2]The Johns Hopkins University Center for Research in Scientific Communication. A Study of Information Exchange at the Sixty-Third Annual Meeting of the Association of American Geographers. JHU-CRSC Technical Report #7. Baltimore, Maryland: The Johns Hopkins University Center for Research in Scientific Communication, November, 1967.

the meeting.[3] These studies, which indicated a number of problems at the AAG national meeting, were instrumental in the institution of proceedings (a premeeting publication of the first full text of papers scheduled for meeting presentation) at the 1969 annual meeting. An additional study comparing scientific information exchange at the 1969 meeting with the 1967 meeting showed that the availability of the Proceedings improved the communication activities of the meeting participants.[4]

The present study focuses on the production, dissemination, and assimilation of material published in the major journals on geography. Selection of journals for the present study began with those most frequently mentioned by the authors who made presentations to the 1967 AAG meeting, as being journals to which they planned to submit manuscripts, based on their meeting presentations. These journals, including those published by AAG, formed the basis of a citation analysis. We examined the references in the issues published during 1965 and 1966, adding to the sample journals often cited therein, analyzing their references in turn. This process continued until a point of diminishing returns had been reached, i.e., until the remaining journals no longer appeared in the mainstream of literature on geography.

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[3] The Johns Hopkins University Center for Research in Scientific Communication. The Journal Publication of Material Presented at the 1967 Annual Meeting of the Association of American Geographers. JHU-CRSC Technical Note #17. Baltimore, Maryland: The Johns Hopkins University Center for Research in Scientific Communication, June, 1969.

[4] Nelson, C. E. and Tomita, K. "Impact of the Proceedings on the annual meeting of the Association of American Geographers: A Comparison of Scientific Information Exchange at the 1967 and 1969 Annual Meetings. Professional Geographer, 1970, 22, 221-226.

Such analyses, conducted for the various disciplines in our program, have indicated in the case of most disciplines that, a small number of journals form the core of the journal literature; a larger number of journals form the periphery of this journal literature; and, a very large group of journals are loosely associated with the first two groups.

On the basis of the analysis for geography, we selected for study all the "core" journals together with the most relevant "tangential" journal:

Economic Geography (core)

Geographical Review (core)

Annals of AAG (core)

Professional Geographer (core)

Journal of Geography (tangential)

Beginning with the first issue published in 1968 and continuing throughout the next two years, as soon as possible after the publication of each issue of a "core" journal, each first author of an article in that issue received a questionnaire pertaining to the content of his article. (If someone was the first author of more than one article, only the earliest such article was used.) We proceeded similarly with the tangential journal, selecting for study, however, only those articles previously published in the "core" journals, or of whose citations a third were to articles in "core" journals, or whose authors held membership in AAG.[5] A total of 256 questionnaires were mailed, and 231

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[5]The Geographical Journal and the Journal of Geology were also selected as tangential journals, however, since only a total of three articles from these two journals satisfied the criteria for inclusion in the sample, these two journals were eliminated.

usable ones were returned. Excluding six nondeliverable questionnaires (because of incomplete address), the response rate for this study was 92%.

In this study we sought principally to trace the prepublication dissemination of the main content of the article, from the beginning of work by the author to the time of publication. Prepublication dissemination may include "preliminary" reports (reports of preliminary findings of work not yet completed), and later reports of completed work (the main content of the work described in the journal articles), e.g., technical and national meeting reports. We also tried to determine the extent to which authors of articles on geography participate directly in these report media and the effect of their participation on their own work as it is modified and revised before submission for publication.

We will discuss the following topics in detail in Part I of this report:

1) The background characteristics of the authors,

2) The prepublication schedule of the work published,

3) The scope and effect of prepublication reports,

4) The submission of manuscripts to journals,

5) The continuity of work in geography, i.e., the extent to which authors were involved in new work related to their articles at the time of its publication, and

6) The availability of information contained in the journal articles from secondary sources.

The main body of the report deals with general findings, while each of the appendices deals with more detailed comparisons such as American and foreign authors (Appendix A) and articles published in the various journals studied (Appendix B).

The second study to be described in this report dealt with the group of persons whom the authors of articles in the journals' study cited as conducting work in the same subject-matter areas as those of their own articles (work which was derived from their findings, stemmed from the same conceptual or theoretical framework, attacked the same problem from a different point of view, stimulated their work, etc.). These persons received questionnaires pertaining to the articles of the authors who had cited them. The questionnaires were designed to determine the following:

1) The extent to which respondents were familiar, before publication of the journal articles, with the work described in the articles,

2) The extent to which respondents had assimilated useful information from authors' prepublication dissemination of the main content of their articles,

3) The extent to which respondents were aware that the articles had been published,

4) The extent to which respondents had examined the articles,

5) The extent to which respondents required useful information from the published articles, and

6) The names of other persons known by respondents to be conducting work in the same subject-matter areas as those of the published articles.

Persons named in the last item above (#6) also received the same questionnaire.

PART I: THE INFORMATION-DISSEMINATION PROCESS ASSOCIATED WITH THE PRODUCTION OF JOURNAL ARTICLES ON GEOGRAPHY

Characteristics of Authors of Articles on Geography

While most of the Authors (81%) held doctorates, 17% held Master's, and 8% held Bachelor's, of the authors without doctorates, 64% were studying for advanced degrees. The median date when the Authors received their highest degree was 1963 or five to six years before the publication of their articles. (Considering estimates that the number of scientists doubles every 12-15 years, we might well have expected half the authors to have received their highest degree in the past 12-15 years.) Therefore, journal article Authors were a relatively young group of researchers.

The Authors named 82 different universities which had conferred their highest degrees. However, over half (53%) of the Authors had received their highest degrees from only 11 universities, and a third from only five institutions.[6] Each Author was asked to name the area within his discipline in which he had received his highest degree. A third of the respondents (31%) simply named "geography" as their area. Those specialties named by at least a tenth of the respondents were: historical geography (19%), economic geography (15%), and urban geography (11%).

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[6] These institutions were: The University of Wisconsin (8.7%), Clark University (6.9%), The University of Chicago (5.6%), The University of Michigan (5.6%), and The University of California, Los Angeles (5.2%).

Almost all (93%) of the Authors were working in academic institutions. These 212 Authors were working in 132 different institutions, one and a half times as many institutions as had conferred these Authors' highest degrees. Forty-three percent of the Authors were the only people at their institutions producing articles in the studied journals during 1968-1969.[7]

The following data demonstrate the international character of the Authors studied: more than a fifth (22%) of the Authors had received their degrees from foreign institutions, and 27% were employed by foreign institutions. Two-fifths of the Authors receiving their highest degrees from foreign institutions had received them from British universities. However, of the Authors employed in foreign countries, only 18% were employed in Great Britain while 40% were employed in Canada. Eleven percent of those who had received their highest degrees from U.S. institutions were working in foreign countries, while 16% of the recipients of their highest degree from foreign institutions were working in the United States.

Authors were asked to rank various professional activities in terms of the amount of time they devoted to each. Most Authors participated to some extent in teaching (94%), in basic research (87%), and in research guidance (74%). Teaching was indicated as the <u>most</u> time-consuming activity by 62% of the Authors and basic research by 20%. Other activities, to which at least a third of the Authors devoted

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[7]Twenty-five percent of those Authors working in academic institutions were working at the following 11 universities: The University of Georgia (3.3%), Syracuse University (2.8%), The University of Wisconsin (2.8%), Michigan State University (2.4%), Ohio State University (2.4%), Kansas State University (1.9%), The University of California, Davis (1.9%), The University of Illinois (1.9%), The University of Minnesota (1.9%), The University of Washington (1.9%), and The University of Toronto (1.9%).

some time, were management or administration (50%), applied research (44%), and consulting (35%).

Nature of Work Reported in Articles

Authors characterized the bulk (70%) of the work reported in the articles as single field studies (45%), theoretical treatises (18%), or a combination of field study and theoretical treatise (6%). The remaining studies were series of studies (9%), methodological works (8%), or other types of reports (11%).

Prepublication Schedule of Work Reported in Articles

Respondents were asked to indicate, relative to the production of their article, 1) when the work had been initiated, 2) when the work had been completed, i.e., had first reached a stage at which a detailed report of the results and their interpretation was possible, 3) when the first rough draft of the manuscript had been started, and 4) when the manuscript had been submitted to the journal in which it was eventually published.

Figure 1 presents time distribution associated with these four events. Work published in journals on geography during 1968 and 1969 had been initiated on the average of 31 months before its publication--18% of the work having been initiated five or more years before its publication. Authors had spent on the average of less than one year (10 months) to complete the work, and had begun writing their manuscripts two months later (or 19 months before publication). Requiring about five months to complete, the typical manuscript had been submitted to the publishing journal 14 months before publication.

The major time lags in this process correspond with publication lags (14 months) and with the period necessary for completion of the work (10 months). Examination of the time distributions associated

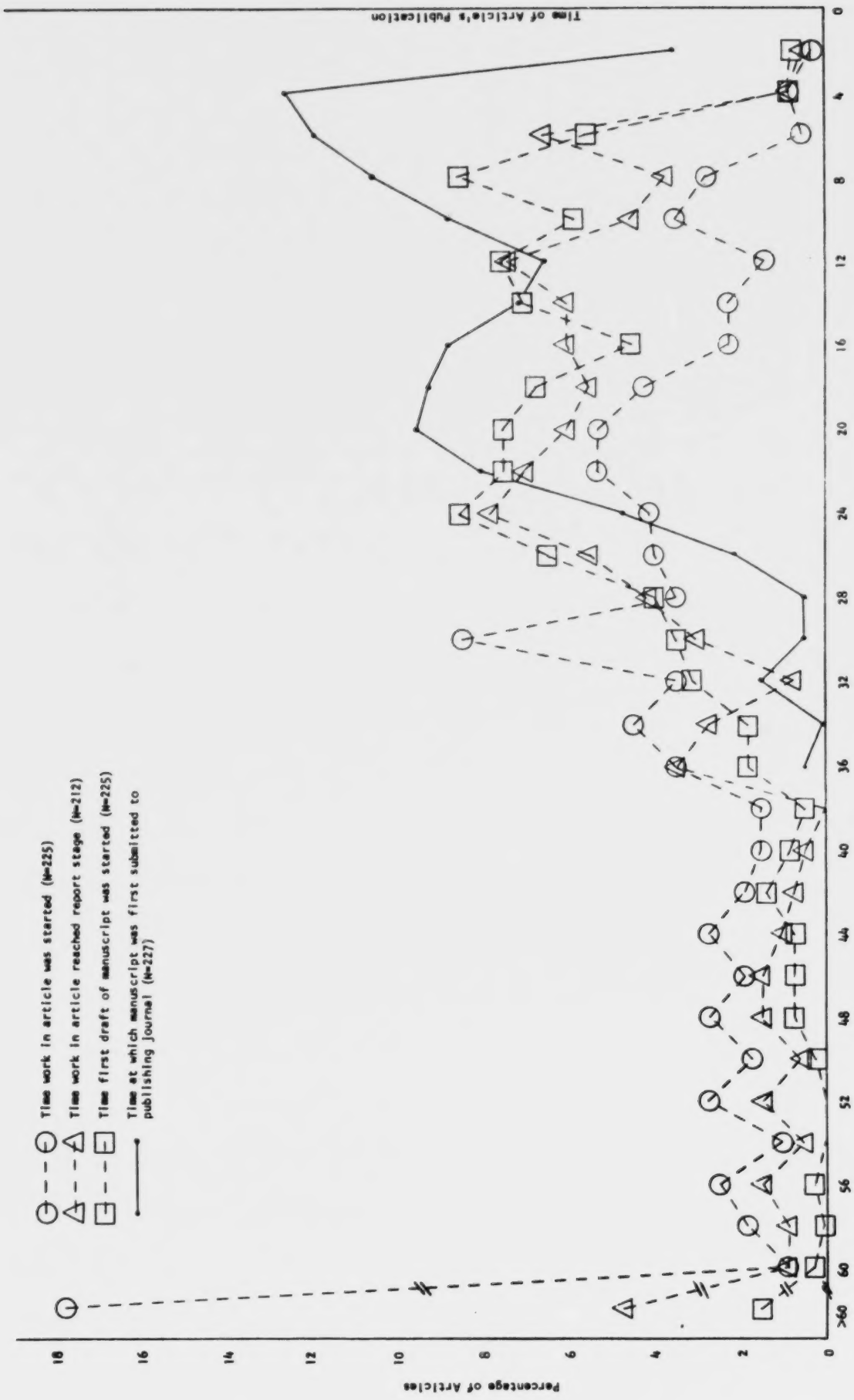
Time of Article's Publication
Percentage of Articles
Months Before Journal Publication
Time work in article was started (N=225)
Time work in article reached report stage (N=212)
Time first draft of manuscript was started (N=225)
Time at which manuscript was first submitted to publishing journal (N=227)

FIGURE 1: TIME WHEN MAJOR EVENTS IN THE PRODUCTION OF JOURNAL ARTICLE OCCURRED

with each of the major stages in Figure 1, shows that the variability associated with a particular stage decreases as that stage approaches the time of publication. That is, the greatest time variability in the process relates to the conducting of the work, and the least time variability with the editorial/publication process. However, the variability of each of these stages is greater for geography than for any other discipline studied.

PREPUBLICATION REPORTS OF THE MAIN CONTENT OF JOURNAL ARTICLES

Nature and Scope of Prepublication Reports

Two-thirds (67%) of the Authors had reported the main content of their articles before their publication. Oral reports had been made slightly more frequently (made by 52% of the Authors) than had written reports (47%); 31% of the Authors had made both oral and written reports.

In the following discussion we have divided these reports into two categories based on when they occurred in the work schedule. "Preliminary" reports were made before the work had been completed, and "prepublication" reports occurred after the work had been completed and the Author could report both its results and his interpretation of them.[8] Typically, preliminary reports were made to very small audiences. For example, 62% of all preliminary reports were given as colloquia, briefings, thesis committee reports, or written theses. Since only 30% of all prepublication reports were preliminary reports, and since most of these were disseminated to small audiences,

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[8] In the section which follows, we shall refer to these two types of reports as preliminary or prepublication when appropriate.

there was little dissemination of the work before its completion. The average preliminary report was presented six months before the work had been completed.

Table 1 shows the percentage of Authors making prepublication or preliminary reports, as well as the kinds of reports made. A colloquium within the Author's own institution (made by 20% of the Authors) constituted the most frequently delivered oral report. Other kinds of oral reports given by at least a tenth of the Authors were presentations at national meetings (17%), presentations at local state or regional meetings (14%), and colloquia outside the Authors' own institutions (10%). Only two kinds of written reports were made by at least a tenth of the Authors; dissertations or theses, by 22%, and copies of oral presentations, by 10%.

Figure 2 shows the periods, relative to the time the work reported in the articles was completed, when Authors made preliminary and prepublication reports of this work. Preliminary reports, constituting 30% of all the reports, increased slightly in frequency as the work neared completion. Almost half (44%) of all the reports took place in the seven-month period between the completion of work and the submission of a manuscript to a journal. A typical Author began disseminating his work as soon as it was completed, a third (34%) of all reports being made within two months of completion of the work. Since 74% of all of the reports are presented before manuscript submission, once a manuscript had been submitted to a journal for publication, the information contained in it was effectively obscured from the scientific community.

Table 1

PRELIMINARY AND PREPUBLICATION REPORTS AND MODIFICATIONS RESULTING FROM SUCH REPORTS

Nature of Report	Percentage Making Report (N=231)	Percentage Modifying[a]	
Any report	67.1%	56.8%	(155)
Oral report	51.5	42.8	(119)
Colloquium within own institution	20.3	31.9	(47)
Colloquium outside own institution	10.0	30.4	(23)
Local, state, or regional meeting	14.3	21.2	(33)
National meeting	16.9	41.0	(39)
International meeting	3.9	44.4	(9)
Scientific or technical committee	1.3	33.3	(3)
Invited conference	4.3	10.0	(10)
Thesis committee meeting	7.8	33.3	(18)
Briefing	1.3	66.7	(3)
Other oral	0.9	50.0	(2)
Written report	46.8	43.5	(108)
Technical report	8.7	30.0	(20)
In-house publication	6.1	50.0	(14)
Thesis or dissertation	22.5	36.0	(50)
Book or part of book	0.9	0.0	(2)
Proceedings or symposium publication	3.0	28.6	(7)
Journal article	3.0	71.4	(7)
Copy of oral presentation	10.4	25.0	(24)
Other written	2.2	80.0	(5)

[a]Numbers in parantheses refer to the N on which the percentage is based, i.e., the number of Authors making a specific type of report.

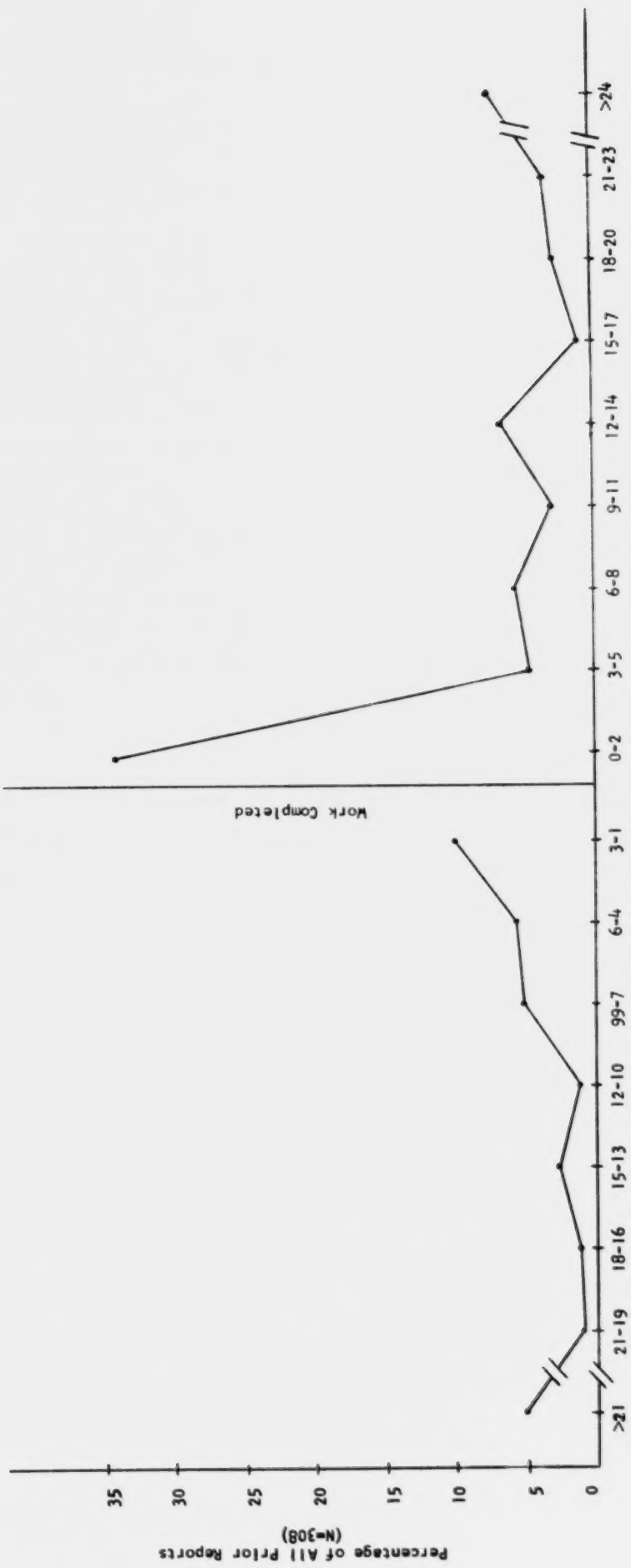

FIGURE 2: TIMES AT WHICH AUTHORS REPORTED MAIN CONTENT OF THEIR ARTICLES BEFORE PUBLICATION

Examination of the times at which the various types of dissemination occurred showed that, whereas physical scientists generally disseminated their work first to small private audiences and then to larger and more public groups, this was not the case for geographers. Oral reports typically occurred in the following sequence: thesis or dissertations (one month before completion); colloquia within the Authors' institutions (at the time the work was completed); local, state, or regional meetings and national meetings (one month after completion); and colloquia outside the Authors' institutions (six months after completion). For written reports the order was: technical reports, theses or dissertations, and copies of oral presentations (at the time the work was completed), and inhouse reports (one month after completion).

The dissemination of work before it was submitted to a journal enabled Authors to disseminate research well before its publication and to receive feedback which allowed them to modify manuscripts before submitting them to journal editors. Fifty-seven percent of those Authors who reported contents of their articles before publication said they had modified their manuscripts because of feedback received from such prepublication reports. Nearly as many Authors who had made oral reports (43%) as had made written reports (44%) reported such modifications. Of the oral reports given by at least 10% of the Authors, national meeting presentations proved the most effective for producing modifications (41% of the Authors who made a national meeting presentations reported modifications because of their presentation). As can be seen in Table 1, colloquia inside and outside the Authors'

institutions were less effective than national meeting presentations but more effective than local, state or regional meetings in inducing modifications. These modifications may be classified into two types: changes in style or general form (accounting for 36% of the modifications) and changes in content, e.g., clarification or redefinition of concepts, incorporation of others' findings, more detailed description of results or process, new emphasis or change in interpretation (accounting for 64% of the modifications).

The distribution of preprints (i.e., prepublication copies of the manuscript) represents another form of prepublication dissemination. Forty-one percent of the Authors distributed preprints, and on the following occasions: 32% distributed them before submission of the manuscript; 14% after submission but before acceptance of the manuscript, and 11% after acceptance, some authors distributing them on more than one such occasion. The median number of preprints distributed at the various stages were two, two, and eight respectively. Authors distributed preprints mainly to two groups: to colleagues working in the same area (mentioned by 78% of those distributing preprints), and to people with some prior knowledge of the work, and who had requested the preprints (mentioned by 39% of these Authors). Since 39% of the Authors sending preprints sent them to people who had requested them, these requests show that people had been effectively informed of the work through informal communication. Only 12% of the Authors who distributed preprints did so as a routine matter to fellow members of a preprint-exchange group.

Those Authors who had distributed preprints before submitting their manuscripts to a journal had an opportunity to receive feedback

leading to modification of their manuscripts. Of those Authors who sent preprints before submission, 75% modified their manuscripts because of feedback from preprint distribution. Of those Authors who modified their manuscripts because of feedback received from preprints, 47% made stylistic changes only, 35% made content changes only, and 20% made both types of changes.

In our tracing of the development of material published in journals on geography, we have reached the stage at which Authors are ready to submit their manuscripts to journals for publication. By the time a manuscript is submitted, the work has been completed for some seven months; almost all prepublication reports have been made; most preprints have been distributed; and modifications due to consequent information feedback have been made.

As to the criteria Authors used to select the journal in which they wished to publish their work, most(80%) of the Authors indicated that "the audience reached by the journal" had constituted a major criterion. The following two reasons were also mentioned by at least one-tenth of the Authors: editorial policy of the journal (25%) and speed of publication (12%).

Not all of the Authors had their manuscripts published in the first journal to which they submitted them. Thirty-six (16%) of the Authors had either withdrawn their manuscripts from, or had received editorial rejection by, another journal. One of these Authors had submitted his manuscript to three other journals before submitting it to the journal in which it was eventually published, and two Authors had each made two prior submissions. The remaining Authors

had made only one prior submission. For one-fourth (28%) of the prior submissions, the Authors eventually withdrew their manuscripts. They gave the following reasons for manuscript withdrawal: 1) suggested revisions were inappropriate (mentioned by 14% of the Authors); 2) suggested revisions were too demanding (8%); and 3) delay in editorial action was too great (6%). However, most of the Authors (69%) of nonaccepted manuscripts had received direct editorial rejection of their manuscripts owing mainly (48%) to the inappropriateness of the subject-matter for the rejecting journals. Other reasons given for rejection were: inappropriate manuscript length (16%), theoretical or interpretational problems (12%), controversial findings (10%), and other reasons (32%).

These 36 manuscripts were withdrawn from or rejected by 76 different journals. At least two of the manuscripts were previously submitted to the following journals: Geographical Review (32%), Economic Geography (12.5%), Annals of AAG and Professional Geographer (10% each), and Science and Journal of Geography (5% each). Annals of AAG especially appears to be a recipient of manuscripts previously submitted to Geographical Review--of the 13 manuscripts previously submitted to Geographical Review, seven were published in the Annals of AAG. Similarly, the Journal of Geography published all of the manuscripts previously submitted to Professional Geographer. The nonacceptance of a manuscript by one journal added eight months to the overall publication lag. Slightly less than half (44%) of the Authors experiencing nonacceptance of their manuscripts revised them before resubmitting them to the journals in which they were eventually published.

Authors' Continuation of Work in the Same Area as That Treated in Their Articles

Since the production of scientific information is a cyclical process (in other words, researchers tend to continue work in the same area as that treated in the articles at time of their publication), Authors were asked questions about work they had done on the same subject since the completion of their articles. By the time of publication most Authors (70%) were involved in new work in the same subject-matter area as that treated in their articles, and 69% of this new work evolved directly from work reported in the published articles. The work of those Authors conducting new work had progressed well--by the time articles were published, 50% of the new work had been completed. Of the Authors whose work had reached the report stage, 43% had reported their new work before the publication of their article, 79% of these Authors had made oral reports, and 62% had made written reports.

At the time of publication, 84% of those Authors who had initiated new work in the same area reported definite plans for publication of this new work. The two media most often mentioned for the planned dissemination of this new work were journals (mentioned by 71% of these Authors) and books (33%). The median date when these Authors planned to submit manuscripts based on this new work to journals was nine months after the publication of their first article.

CITATION OF THE ARTICLES IN POSTPUBLICATION (SECONDARY) SOURCES

We were also interested in the dissemination process after the articles were published. Three secondary sources were studied: Geographical Abstracts, references in the "core" journals on geography,

and review articles published in the journals studied. We considered the extent to which these secondary sources covered the field of geography and also the time lags between their appearance and the publication of the cited articles. Each of these secondary sources serves a different function in integrating the literature on geography: (1) the abstract places the article in a public secondary source along with other contemporary works on the smae subject; (2) citations by other articles relate the article to the cumulative knowledge on the subject; and (3) reviews synthesize and evaluate "recent" progress in an area.

Publishing Abstracts of Journal Articles on Geography

Abstract journals typically are the first secondary source to cite articles after publication. Geographical Abstracts, published in England, represented the only abstract journal analyzed in our study since it is the only abstracting service which covers the entire field of geography. Started in 1960 as Geomorphological Abstracts, in 1966 it expanded to include the entire field of geography and changed its name accordingly. The abstracts are published quarterly and consists of four volumes: Geomorphology; Biogeography, Climatology, and Cartography; Economic Geography; and Social Geography.

We did not search in this source for the specific articles included in this study. Instead, for all 1969 issues of Geographical Abstracts we determined for each journal studied here the number of months between publication of an article and publication of an abstract of its content in Geographical Abstracts. The median time between an article's publication and its appearnace in Geographical

Abstracts was 19 months. However, the abstracts exhibited very different time lags according to the journal in which they were published. The longest time lags were associated with the Journal of Geography and the Annals of AAG (21 months each). The median time lag for Economic Geography was 15 months, while for the Professional Geographer it was 12 months. The Geographical Review (8 months) had the shortest lag.

Not only were there great disparities from journal to journal in the time lag between publication and abstraction, but there was also great variation in the extent of coverage. An indication of the disparity can be seen when we examine, for each journal, the ratio of the number of abstracts published in 1969 in Geographical Abstracts to the number of articles published in 1968. This measure is, in a sense, arbitrary since we are not reporting the percentage of 1968 articles abstracted in 1969. The ratios for each of the core journals were: Geographical Review, 5/24; Professional Geographer, 17/52; Economic Geography, 14/22; and Annals of AAG, 86/50. Thus, for the Annals, more abstracts were published in 1969 than the number of articles published in 1968. An examination of the time lags involved suggests that the Abstracts were catching up with articles in the Annals because they had failed to publish, soon after publication, abstracts of articles published in 1966 and 1967.

Citation of Journal Articles by Authors of Subsequent Journal Authors

In their articles Authors usually cite previous work, when relevant, in order to place their current work in proper perspective. Perhaps the first occasion wherein specific work reported in articles is integrated systematically into the current body of scientific

knowledge takes place when the work is cited in other articles. Examination of recent issues of the four "core" journals (i.e., issues published after those included in this study) revealed that insufficient time had elapsed since the studied articles were published to allow for their citation in other articles. Accordingly, to estimate the time lag in this process, we examined every issue in 1968 and 1969 of each of the "core" journals and the 1969 issues of the Journal of Geography and tabulated the publication dates of the cited articles published in the studied journals. This procedure turned up 548 citations to articles published previously in these journals.

Annals of AAG was the journal cited most often, 34% of all references citing its articles. Geographical Review accounted for 25% of the references, followed by Economic Geography (20%), Professional Geographer (11%), and Journal of Geography (10%). Each journal cited itself most frequently,with the exception of Professional Geographer. However, the next most frequently cited journal in each case was the Annals of AAG. These data, together with the detailed cross-references among the five journals, are presented in Table 2.

The cited articles were relatively old. The typical citation of an article published by the journals studied occurred 78 months after the articles' publication, i.e., 50% of the citations were of articles which had been published no less than 78 months earlier. The average age of a citation to Professional Geographer was 56 months, to Annals of AAG 64 months, to Journal of Geography 94 months, to Economic Geography 95 months, and to Geographical Review 109 months. (See Table 3). These data on age of citations of the various journals show two

Table 2

CROSS-CITATIONS OF ARTICLES IN JOURNALS ON GEOGRAPHY

Cited Journal	Citing Journal					
	Annals (N=205)	Geographical Review (N=68)	Economic Geography (N=97)	Professional Geographer (N=105)	Journal of Geography (N=73)	Total (N=548)
Annals of AAG	42%	26%	35%	30%	20%	34%
Geographical Review	23	47	19	26	15	25
Economic Geography	16	16	39	20	12	20
Professional Geographer	9	7	6	19	12	11
Journal of Geography	10	3	1	5	40	10

Table 3

MEDIAN TIME BETWEEN PUBLICATION OF ARTICLES IN GEOGRAPHICAL JOURNALS AND THEIR CITATION IN GEOGRAPHICAL JOURNALS

Journal of Cited Article	Journal of Citing Article					
	Annals	Geographical Review	Economic Geography	Professional Geographer	Journal of Geography	Total
Annals of AAG	60 mos.	48 mos.	69 mos.	66 mos.	94 mos.	64 mos.
Geographical Review	>120	51	120	109	93	109
Economic Geography	106	>120	99	68	98	95
Professional Geographer	52	91	75	41	78	56
Journal of Geography	>120	a	b	78	28	94
Total	95	60	81	67	63	78

[a]Only two citations were made.

[b]Only one citation was made.

clusters of journals--those published by AAG and those published by other groups. The average age of a citation to AAG journals was much less than of the other journals.

Turning to the age of citations in each of the journals studied, we found a completely different ordering. In the Geographical Review the average age of citations of the journals studied was 60 months, in Journal of Geography 63 months, in Professional Geographer 67 months, in Economic Geography 81 months, and in Annals of AAG 95 months. Thus, the articles in journals which cite more recently published work are the articles which tend to enjoy a longer period in which they are cited. At this time it is difficult to speculate as to the underlying factors in such a relationship.

Published Reviews of Journal Literature on Geography

Another stage in the dissemination process occurs when the work described in the published journal article is integrated into a published review of a subject-matter area of geography. In most disciplines there exists some journal or volume which solely publishes reviews, e.g., Reviews of Geophysics or any of the Annual Review series; however, this is not true in geography. Therefore, in order to obtain an estimate of when this process occurs on the time scale for the information flow in geography, we tabulated the references cited in any of the articles studied where the Author indicated in his questionnaire that the work was a review. Twenty review articles appeared in these issues and the Authors of the articles cited a total of 402 journal references.

In examining these references we were specifically interested in references to articles published in the five journals studied. The following percentages of the total (402) journal references which were citations to articles published by each of the five journals gives some idea of the extent to which each of the journals was cited in these reviews.

Annals of AAG - 9.4%

Geographical Review - 8.7%

Economic Geography - 4.5%

Professional Geographer - 3.5%

Journal of Geography - 0.5%

Thus, only a little more than a fourth (27%) of the journal references were to the articles published in the journals studied. Also, the average time between publication of the article in one of the studied journals and its citation in a review was 57 months. And 27% of these citations were to articles at least ten years old.

PART II: EXAMINATION OF INFORMAL COMMUNICATION IN GEOGRAPHY

Research published in the average journal article on geography was completed 21 months before publication. Most Authors reported their work before publication. Prepublication dissemination enabled the information consumer to acquire useful information well before its journal publication. This section of the report discusses the effect of prepublication dissemination of information (eventually contained in the articles studied) on other workers in the same areas as those treated in the articles.

METHOD

In the study described in Part I, the Center for Research in Scientific Communication examined the dissemination process associated with work published in journals in geography. Each Author of an article included in this study was asked to name one or two persons conducting work in the same subject-matter area as that of the main content of his own article, work which he considered closely related to the work reported in his article (i.e., deriving from its findings, stemming from the same conceptual or theoretical framework, attacking the same problem from a different point of view, etc.). The persons listed by these Authors constituted one group of subjects in the present study, and will be referred to hereafter as first-generation subjects.

Since the Center was particularly interested in the informal network associated with prepublication information exchange, each first-generation subject was also requested to name one or two persons working in the same subject-matter area as that of the published articles. After deletion of names of authors of articles included in the initial study and of first-generation subjects, the remaining persons constituted the second-generation subjects. This process was repeated once more, but by the third generation we had clearly reached a point where few new persons, relative to the subject matter of any article, were being added to the sample, i.e., most of the third-generation names had already been listed by Authors or first-generation subjects. For all generations combined the response rate was 77%. In this report the data have been separated

into two groups, those concerning the first-generation subjects (Generation A) and those concerning all other generations (Generation B).

CHARACTERISTICS OF RESPONDENTS

Educational Background

Table 4 presents data on the characteristics of the article Authors (who named persons in Generation A) and the other workers in the field (Generation A and Generation B), and shows no differences between the groups in level of education (similar percentages of each group had doctorates). Generation A respondents were more experienced in the field (the typical Generation A respondent had received his highest degree six years before the typical respondent in each of the other groups), and more of them had received their highest degrees from foreign universities. Comparing the specialties in which they received their highest degrees we found no major differences between Authors and Generation A. However, more of Generation B had specialized in historical geography and fewer failed to indicate a specialty than had the other groups.

Current Professional Activities

Seventy-three percent of the Authors and 84% of Generation B were employed at U.S.A. institutions; however, only 66% of the Generation A respondents were employed within the U.S.A.

In terms of the most time-consuming activities in which respondents were currently engaged (shown as Primary Professional Activity in Table 4), there were several significant differences

Table 4

CHARACTERISTICS OF RESPONDENTS

	Percentage		
	Authors N=231	Generation A N=60	Generation B N=19
Highest Degree			
Ph.D.	81.4%	83.3%	78.9%
MA/MS	16.5	15.0	5.3
BA/BS	1.7	--	10.5
Median date	(1963)	(1957)	(1963)
Awarded by U.S.A. institutions	78.3	66.1	83.3
Awarded by foreign institutions	21.7	33.9	16.7
Location of Current Employer			
Within U.S.A.	73.2	68.3	84.2
Outside U.S.A.	26.8	31.7	15.8
Primary Professional Activity			
Teaching	61.5	45.0	31.6
Basic research	19.9	23.3	26.3
Applied research	6.5	3.3	10.5
Management or administration	5.6	13.3	15.8
Study for advanced degree (part or full time)	4.3	1.7	--
Research guidance	0.9	5.0	5.3
Consulting	0.4	1.7<	10.5
Writing or editing	--	5.0	--
Professional Activities (any time involvement)			
Teaching	93.5	91.7	78.9
Basic research	87.4	83.3	73.7
Applied research	43.7	36.7	73.7
Management or administration	49.8	53.3	57.9
Studying for advanced degree (part or full time)	12.6	5.0	--
Research guidance	74.5	80.0	63.2
Consulting	35.1	50.0	52.6
Design or developmental work	10.4	13.3	21.1
Test or support activities	10.0	6.7	5.3
Writing or editing	19.0	31.7	--

between each of the three groups. Compared to both groups of other workers more Authors indicated teaching and fewer indicated management or administration as their primary professional activity. Furthermore, more Generation A than Generation B respondents indicated teaching and fewer indicated consulting as their primary professional activity.

Table 4 also shows the professional activities in which respondents reported <u>any</u> current involvement. Compared to Generation A respondents, Authors reported more involvement in applied research and studying for advanced degree and less involvement in research guidance, consulting, writing, and editing. We find, then, that Authors generally nominated other workers (Generation A) who 1) had more experience, 2) had, to a greater extent, received their highest degree from foreign institutions, and 3) were more involved in professional activities positively correlated with experience (research guidance, consulting, writing, and editing).

On the other hand, Generation A respondents named other workers who were quite different both from themselves and from the Authors. Compared to Generation B, Generation A respondents:1) had more experience; 2) had more frequently received their highest degree and were more frequently employed in foreign countries; 3) were more basic-research academically oriented, and less involved in applied research.

INVOLVEMENT IN SAME AREA AS THAT DESCRIBED IN THE ARTICLES[9]

Most of the persons in both generation groups had conducted work in the same subject-matter area as that described in the critical articles; 58% of Generation A and 74% of Generation B reported such activities in the year prior to the publication of the critical articles.

Both generations had actively disseminated the results of their work in the area of the critical articles; however, Generation B had more actively disseminated such results. While 63% of Generation B had published one or more articles, only 50% of Generation A had published such articles. Moreover, Generation A had published these articles over a longer period before the publication of the critical article, 43 months, than Generation B, 36 months. And more of the Generation B respondents (58%) than Generation A respondents (38%) had presented work at national meetings in the same subject-matter area as the critical article.

RESPONDENTS' CONTACT WITH INFORMATION IN THE PUBLISHED JOURNAL ARTICLES

This section of the report deals with the nature and extent of other workers' contact with the information reported in the critical articles. We shall first consider communication activities which occurred before publication of the critical articles and then

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[9]Each respondent had been associated with a specific journal article by a previous respondent. Thus, we are concerned with a generation respondent's involvement in that subject-matter area of the specific article with which he had been associated. In this report, a generation respondent's activities always relate to a specific article. Such articles are referred to as "critical articles."

postpublication communication activities. Figure 3 diagrams the relevant events and the text refers to these events by the letters used in the diagram.

Prepublication Contacts With the Main Content of the Published Articles

Most of the respondents in each generation (Generation A, 78%; Generation B, 79%) were acquainted with the previous work of the article Authors, work conducted by Authors before that reported in the critical articles (A).

Although Generation B had published more often in the area of the critical articles, Generation A had more often cited the Authors' works in their own work (B)--Generation A, 42%; Generation B, 32%.

Although more of Generation B was currently working in the areas of the critical articles, the communication channels between Authors and other workers in their fields was better maintained for Generation A than Generation B; for example, 58% of Generation A compared to 42% of Generation B, reported that they maintained contact with the Authors on a continuing basis to exchange scientific or technical information (C). The effectiveness of this relationship is reflected in the finding that Generation A workers were more frequently acquainted with the specific work described in the critical articles before publication (D)--Generation A, 58%; Generation B, 42%.

That Generation A workers interacted more personally with Authors, while Generation B workers depended more on formal sources, apparently constitutes the major difference between the two in the prepublication acquaintance with the material in the critical article. Face-to-face

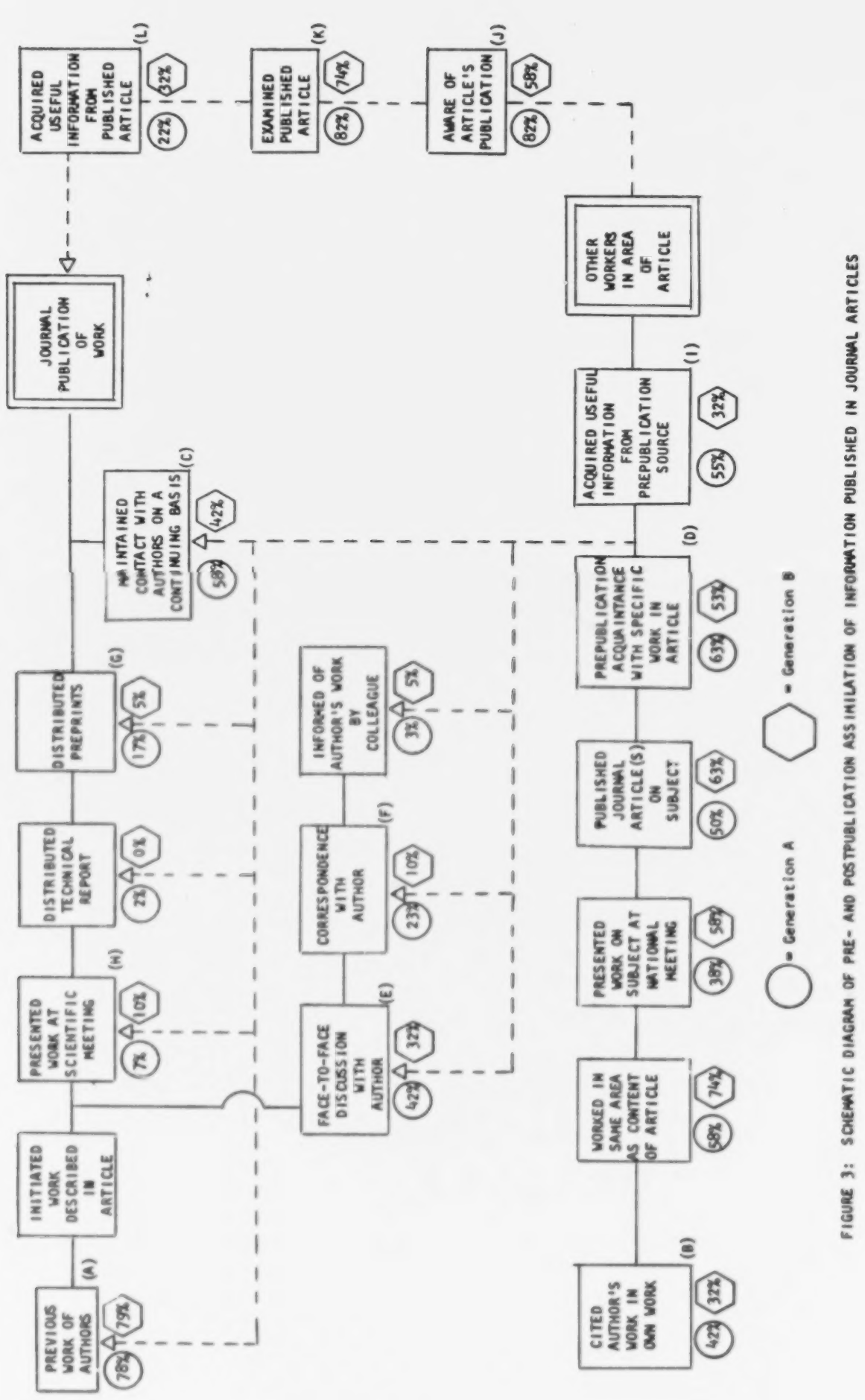

FIGURE 3: SCHEMATIC DIAGRAM OF PRE- AND POSTPUBLICATION ASSIMILATION OF INFORMATION PUBLISHED IN JOURNAL ARTICLES

discussion with the Authors (E) constituted the main source of prepublication information for both groups; however, more of Generation A (42%) than Generation B (32%) obtained information in this way. For Generation A, both of the other sources of prepublication, which were indicated by a tenth of the respondents, were personal in nature (correspondence with the Authors, 23% (F), and preprints, 17% (G)). For Generation B, however, one of the two sources mentioned by a tenth of them was impersonal (meeting presentations (H), 10%). Furthermore, correspondence with Authors, the second such source, was indicated by only 10% of Generation B compared to 23% of Generation A.

Over half (55%) of Generation A reported that they had, through one of these prepublication sources, acquired information useful in their work; 32% of Generation B reported that they had acquired such useful information (I). Additionally, more of the Generation A respondents who were acquainted with the material in the critical article before its publication had acquired information from this acquaintance which proved useful in their work, Generation A, 87%; Generation B, 60%.

The three ways most frequently mentioned by Generation A respondents in which this information proved useful were in reinterpretation of data (mentioned by 30% of those finding the information useful), in providing background information (mentioned by 27%) and in incorporating a new technique (mentioned by 21%). Other benefits mentioned by a number of respondents were revision of procedures and specific results (both mentioned by 15%). For Generation B the responses were similar but the small number of cases makes comparison meaningless.

An equal percentage of Generation A respondents who found the information useful found the results and method sections most useful (39%) while 27% found the theory section most useful.

Postpublication Contact with Critical Journal Authors

More of the Generation A respondents (82%) than Generation B respondents (58%) were aware, prior to receiving the questionnaire, that the article had been published (J). However, there was little difference between the two groups in the percentage who had examined the article (Generation A, 82%; Generation B, 74%).[10] Table 5 shows the extent to which the articles were examined. Over half the respondents (Generation A, 60%; Generation B, 63%), had read the entire article in its published form. This proportion amounts to three-fourths of the Generation A and five-sixths of the Generation B respondents who examined the article at all. Twenty percent of Generation A and 5% of Generation B respondents had merely scanned the article. The remaining respondents had read only a portion of the article.

Compared with the usefulness of the information in prepublication sources, the information in the journal article proved less useful to Generation A and equally useful to Generation B respondents. Twenty-two percent of Generation A and 32% of Generation B respondents

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[10]For Generation B the reason that the percentage of respondents who were aware of the articles' publication was less than the percentage who examined it, is that a number of respondents who were unaware of the articles' publication examined it as a result of receiving the questionnaire. For Generation A a number of respondents who were unaware of the articles' publication also indicated they examined it as a result of receiving the questionnaire.

Table 5

EXTENT TO WHICH CRITICAL ARTICLES WERE EXAMINED

Extent of Examination	All Respondents		Respondents who Examined Article	
	Generation		Generation	
	A N=60	B N=49	A N=14	B N=14
Examined content of articles	81.7%	73.7%		
Merely scanned content of articles	20.0	5.3	24.5%	7.1%
Read some portion (e.g., theory, methodology, results, etc.) of article	1.7	5.3	2.0	7.1
Read entire article	60.0	63.2	73.5	85.7
Acquired information useful in their work from examination of article in its published form	21.7	31.6	26.5	42.8

reported having acquired useful information upon examination of the journal articles (or 26% of those Generation A and 43% of those Generation B respondents who had examined the published articles acquired useful information from them (L)). As was mention earlier, 55% of Generation A and 32% of Generation B respondents had acquired useful information from some prepublication source. The ways in which the information proved useful (i.e., reinterpretation of data, background information, incoporating a new technique),and the sections of the journal articles which proved most useful (i.e., results, method, theory) were quite similar to the findings from prepublication sources.

COMPARISON OF GENERATION RESPONDENTS ACQUAINTED WITH THE SPECIFIC WORK DESCRIBED IN THE ARTICLES BEFORE THEIR PUBLICATION WITH GENERATION RESPONDENTS HAVING NO SUCH ACQUAINTANCE

More than one-third of the generation respondents indicated that they had had no acquaintance with the specific work reported in the journal articles before their publication. In this section we compare background characteristics and scientific information-exchange behavior of this group (No-Prior-Contact Group) with those respondents who <u>were</u> acquainted with the content of the article before its publication (Prior-Contact Group).

Background Characteristics of Respondents

There was no difference between the groups either in their level of education or in the percentage receiving their degrees from foreign institutions. However, the Prior-Contact Group had more experience in the field, in that on the average they had received their highest

degrees five years before the No-Prior-Contact Group. Also, more of the No-Prior-Contact Group had specialized in historical geography and fewer in economic geography. The professional activities in which the two groups participated were similar. However, more of the No-Prior-Contact Group indicated teaching as their most time-consuming activity (48% compared to 38% for the Prior-Contact Group). Additionally, more of the Prior-Contact respondents were involved in management or administration (66% compared to 41% for the No-Prior-Contact Group) and applied research (51% compared to 41% for the No-Prior-Contact Group).

Work Conducted in the Same Area as that Described in the Articles

The two groups differed in the extent to which they were active, in the last year, in the same subject-matter areas as those of the articles. The Prior-Contact Groups was more active (70% of the Prior-Contact Group compared to 48% of the No-Prior-Contact Group indicated such activity). The Prior-Contact Group had been more active in publishing journal articles in the area (60% compared to 45% of the No-Prior-Contact Group) but not in making presentations at national meetings (45% of both groups). There was evidence, however, that the No-Prior-Contact Group may have been active in the distant past. For example, respondents in the No-Prior-Contact Group who had published articles in the area had published their earliest article on the average more than a year earlier. (The No-Prior-Contact Group had typically published their earliest such article 87 months before the publication of the critical articles while the Prior-Contact Group had done so 74 months earlier.) Therefore, some of the No-Prior-Contact Group

apparently were active at one time, had gained recognition for the work, and became less active in the area.

Contact with the Journal Article

More of the Prior-Contact Group reported awareness of the Author's earlier work (i.e., work conducted before that reported in the critical article than did the No-Prior-Contact Group.) Ninety-four percent of the Prior-Contact Group compared to 55% of the No-Prior-Contact Group reported such acquaintance. Furthermore, among those respondents in each group familiar with the Author's previous work, the Prior-Contact Group had slightly more frequently cited the Author's previous work in their own reports (52% of these Prior-Contact respondents compared to 44% of those No-Prior-Contact respondents) and had more often maintained continuing contact with the Authors to exchange scientific or technical communication (77% among the respondents in the Prior-Contact Group compared to 56% of those in the No-Prior Contact Group).

Seventy-nine percent of the Prior-Contact Group and 72% of the No-Prior-Contact Group at the time of the survey knew that the articles had been published. And 17% of the Prior-Contact Group and 24% of the No-Prior-Contact Group had not seen the issue of the journal in which the article was published.

Eighty-three percent of the Prior-Contact Group and 76% of the No-Prior-Contact Group had examined the article. The No-Prior-Contact Group, however, had examined the articles more thoroughly (82% of the respondents in the No-Prior-Contact Group who had examined the article

read all of it, while 74% of those respondents in the No-Prior-Contact Group had done so).

Examining the uses and effects of prepublication sources and of the published article, we found that the article seemed of little use to those already familiar with the work before its publication. Only 6% of the Prior-Contact Group had gained useful information from the published article. Since most of this group (62%) had read the entire article, the information in the published article seemed redundant and served for the Prior-Contact Group essentially as a check, after the manuscript had gone through the reviewing process, of the information obtained earlier in the dissemination process. That is, they wanted to see if anything new or different had been added to the content of the article since they had encountered information about it earlier in the informal domain.

The situation for the No-Prior-Contact Group appeared altogether different. Over half (52%) of these respondents acquired useful information from the article. This figure seems especially impressive when one realizes that 24% of the No-Prior-Contact Group had not examined the article. Therefore, 68% of the No-Prior-Contact Group who had examined the article found useful information in it. For these respondents the three most frequently mentioned ways in which this information proved useful were for background data (mentioned by 36% of those finding the information useful), for incorporation of a new technique, and for reinterpretation of data (each mentioned by 28%). As was the case with useful information obtained from prepublication sources, the results and the methods sections were the two sections

which proved most useful. The results section was indicated as most useful by 50% of the No-Prior-Contact Group having obtained useful information from the published article, and the methods section by 43%. Thus, the extent to which scientists gained information useful in their work from a published article,within a year of its publication, is apparently inversely related of the extent to which they acquired useful information (eventually contained in the article) from prepublication sources.

The published articles served mainly the No-Prior-Contact Group, which was not part of the informal network through which the published articles had been disseminated well before publication. Compared to the Prior-Contact Group, the No-Prior-Contact Group seemed less involved in the mainstream of geographical research. For example, they had had less experience and were less involved in the subject areas of the articles. Since they were less involved in the mainstream of research, it seems only logical that they should have been less involved in the informal communication network.

The ways in which the information obtained from the articles and prepublication sources proved useful were similar. Therefore, while prepublication sources serve similar information functions as do the articles for workers active in an area, they do so much earlier in the dissemination process. In fact, respondents who were aware of information before its publication indicated that they were first aware of it on the average two years before its publication.

SUMMARY: AN OVERALL DESCRIPTION OF THE DISSEMINATION PROCESS ASSOCIATED WITH INFORMATION PUBLISHED IN JOURNALS ON GEOGRAPHY

Figure 4 diagrams the process of the dissemination of scientific information from the time a scientist begins his work until the time it appears in secondary sources. The following discussion describes this process for the typical Author, and takes as its reference point the date of journal publication, relating all events, both before and after publication, to the date.

Work published in the journals studied begins 31 months on the average before publication. About six months before the work is completed, about a fourth of the Authors present preliminary reports of their work. These reports of preliminary findings do not constitute significant communication of research findings, since geographers, usually present such initial, incomplete findings to small groups.

Genuine dissemination begins when the Authors have completed their work--21 months before publication. Two-thirds of the Authors make some such report. Whereas for a number of other desciplines studied a pattern of increasingly wider dissemination about the work as it develops is evident, for geographers dissemination in all types of media typically occurs soon after the work is completed. About 18 months before their publication, the main content of a sixth of the articles is reported at a national meeting. The national scientific meeting also represents an occasion wherein considerable material is disseminated in written form. (For example, 92% of the authors of presentations at an annual AAG meeting received requests for copies of their presentations.)

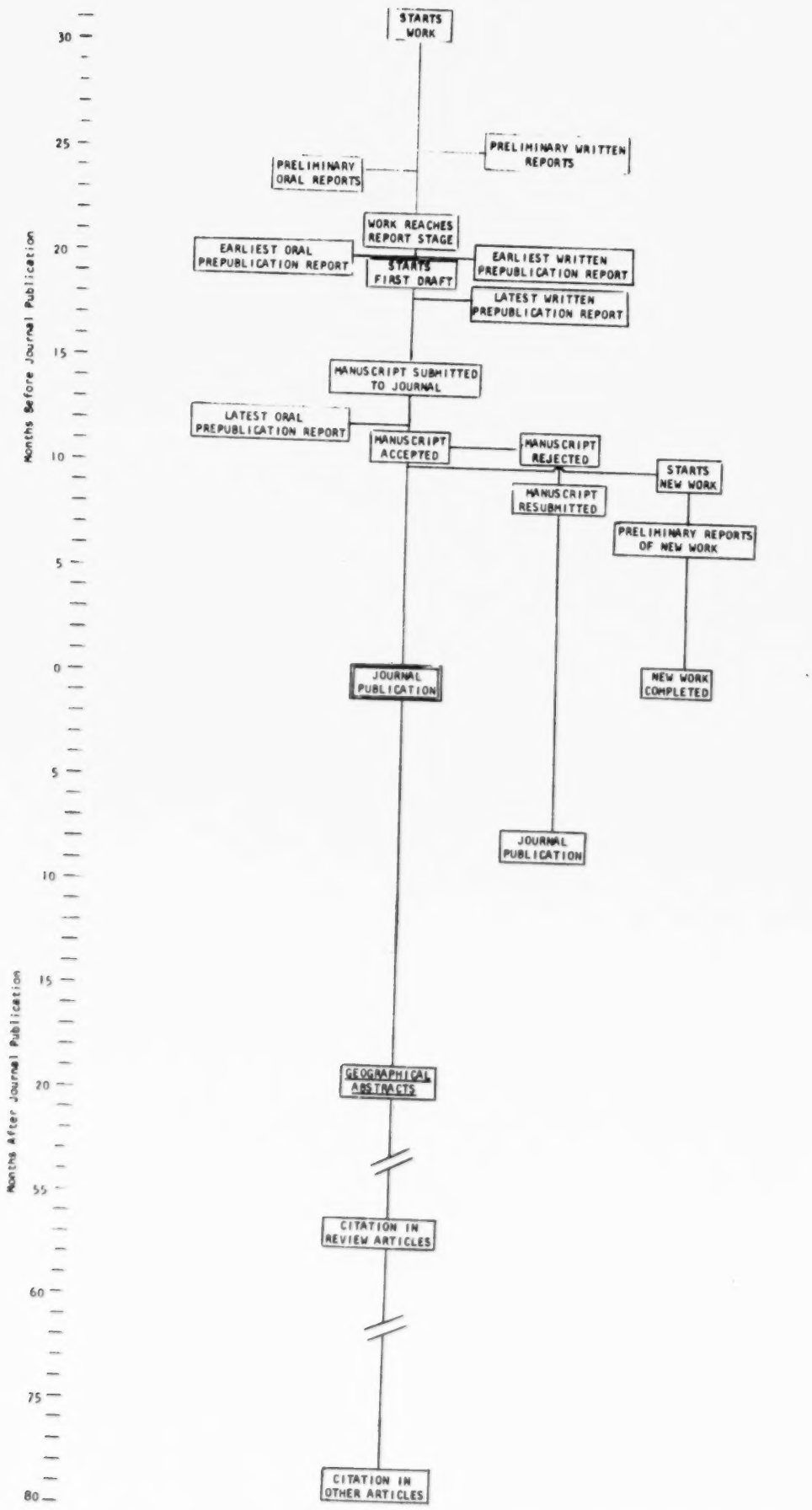

FIGURE 4: SCHEMATIC DIAGRAM OF INFORMATION FLOW IN GEOGRAPHY

The thesis or dissertation represents a major prepublication medium for journal articles. The main content of one article in four derives to some extent from a thesis or dissertation. Information based on theses or dissertations seems to move slowly through the prepublication process since the typical written thesis is completed 27 months before its publication.

The bulk of the prepublication dissemination process in geography occurs within the seven months immediately after the Author completes his work. This intensive prepublication dissemination serves both the Author and the consumer. For the Author, it provides feedback which helps him shape his work into a better scientific product. Over half of the Authors who made prepublication reports were led, because of feedback, to modify the presentation of their work in the manuscripts which they later submitted to journals. Almost two-thirds of those modifications involved changes in content rather than changes in style or format. Therefore, prepublication dissemination in geography serves an important function in processing information for later journal publication.

The prepublication dissemination apparently serves fairly well in informing other workers active in the same field of the research. Of those other workers in the same area as the Author's, 14% had known of the main content of the article before its publication, specifically by means of an Author's prepublication report.

The Authors were divided into the following four groups, based on their prior dissemination activity: (1) no prior dissemination, (2) preliminary reports only, (3) prepublication reports only,

and (4) both preliminary and prepublication reports. Those Authors who made prepublication reports (with or without having made preliminary reports) held doctorates less often than those who made no such reports. Those who made no prior reports had received their highest degree on the average of four years before those who did make prior reports, and fewer were primarily involved in basic research. More of the Authors who made only preliminary reports were primarily involved in basic research than any other group.

The production of prepublication reports usually delays journal publication of the work. Comparison of Authors who made prepublication reports with those that did not shows that the prepublication-group Authors spent four to five months longer than the others from the time they had completed their work until they submitted their manuscripts--this was the time when they made their prepublication reports.

Differences also emerged between the three groups making prior reports with regard to the extent to which these reports led to modifications in the manuscript which was submitted. Those Authors who made preliminary reports were more likely to have modified their manuscripts as a result of these reports than were Authors who made prepublication reports. These modifications served the Authors well since fewer of the Authors who modified their manuscripts as a result of prepublication reports had their manuscripts rejected than either than either the Authors who made prepublication reports but did not modify their manuscripts or the Authors who made no prior reports.

Preprint distribution constitutes another form of prepublication dissemination. Over two-fifths of the Authors distributed drafts of

the manuscripts they had prepared for journal submission. Like most other scientists, geographers view preprint distribution as a special kind of prepublication dissemination, and not as a substitute for other forms of dissemination. In fact, more of the Authors who distributed preprints before they submitted their manuscripts had made some earlier prepublication report than those who did not distribute preprints at this time.

Distribution of preprints before submission provides one last opportunity for the Author to receive comments on his work before involving it in the journal editorial process. Nearly one Author in three distributed preprints at this time, and three-fourths of those who did received valuable feedback which led them to modify their manuscripts. Changes in style constituted 56% of the modifications; the remaining 44% consisted of changes in content (reanalysis of data, redefinition of concepts, revised interpretation of findings, etc.)

At this point, manuscript submission occurs. The average time between submission and publication was 14 months. Only 36 (16%) of the 231 articles studied had been submitted to journals other than those which eventually published them. Such rejections added eight months, on the average, to the publication lag.

Although few Authors had previously submitted their manuscripts to journals other than the one which published them, comparison of this group with the remaining Authors revealed some interesting differences. More of the Authors who received rejections indicated both teaching and basic research as primary activities. And more

of them were involved in research guidance, writing, and editorial work not connected with their research; fewer were involved in consulting than Authors who did not receive rejections. More of the rejected manuscripts were reports of single studies.

Not surprisingly, the time between initiation of work and journal publication was eight months longer for the group receiving a rejection. Four of these additional months were due to the time involved in receiving a rejection. However, it also took four months longer for the publishing journals to process and publish manuscripts which had previously been submitted elsewhere. Compared to Authors who did not receive a rejection, fewer of the Authors who had their manuscripts rejected had made prepublication reports, and of those who did fewer had modified their manuscripts as a result of such reports. While more of the Authors receiving a rejection had distributed preprints before submission, fewer of those who did modified their manuscripts as a result of such feedback. More of the Authors receiving a rejection were concerned with the editorial policy of the journal which published their manuscript. And finally, less were involved in new work in the same subject-matter area as their article.

Their manuscripts submitted, few Authors continue to make prepublication reports. However, preprint distribution continues, one in seven Authors distributing preprints during the period between submission of the manuscript and its acceptance. Additionally, one in ten Authors distributed preprints after having received notification of manuscript acceptance. While the distribution of preprints before submission appears to be an attempt on the part of the Authors to

obtain useful information feedback, distribution after submission seems to serve as an early publication medium.

Preprint distribution apparently represents the consumer's last opportunity to gain access to the information before it is published. The finding that 39% of the Authors who distributed preprints did so to persons who had some familiarity with their work earlier in the process and who had requested Authors to send them a copy of the manuscript upon completion, attests to the extent of consumers' reports to gain early access to the information.

In the period between the time Authors submit their manuscripts and have them published, they typically are conducting new work in the same subject-matter area as that treated in their submitted manuscripts. Over two-thirds of this new work evolved directly from some results of the work described in the mansucripts.

Authors initiate this new work on the average of four months after submitting the completed work. By the time the previous work is published, half of the new work has already reached a stage at which detailed reports of their results and interpretations are possible. In fact, a fifth of the new work had been reported (in either written or oral form) seven months on the average before the previous work was published.

As mentioned earlier, little prepublication dissemination of the main content of an article occurs after it has been submitted to a journal. This is not surprising since during this period the Author is involved in his new work. Therefore, he is more interested in disseminating the results of the new work than in disseminating those

of the previous work. In fact, by the time this new work is published, the information contained in the article is, to a certain extent, obsolete, since 1) further work in the subject-matter area as that in the article has been conducted by the Author, usually evolving directly from the work reported in his article, and 2) most Authors plan to submit this new work to journals within nine months of the publication of the article.

Following publication of the journal articles, abstracts of the articles appear in secondary sources. One abstract journal, Geographical Abstracts, abstracts articles in all of the journals on geography included in this study. The delay between journal article publication and abstract publication differs for the various journals, the average such delay ranges from 8 to 21 months. The delay in publishing abstracts for all five journals averaged 19 months. There were also great disparities in the coverage of the journals by Geographical Abstracts. The ratio for each journal of the number of articles published in it in 1968 to the number of abstracts of its articles published in 1969 ranged from 24/5 to 50/86, indicating a great disparity in the extent to which each of the journals was covered in the abstracts.

Next in the information flow in geography, the Author of a review article synthesizes the works of many authors and integrates the information contained in these works into the current body of scientific knowledge. An article cited in such a review was published on the average 57 months before the review article's publication.

The final event, in the information flow process we have examined in geography, is the citation of the article by other authors in their published work. Other authors cite, in their published articles, work which has been published on the average of six and a half years earlier. This citation process will continue for many years and it tapers off slowly--35% of these citations are more than ten years old.

The information flow process (see Figure 4), from the initiation of a piece of research until its integration into the archival body of scientific knowledge is extremely long and slow. Only a little flows through "public" media compared with media which reach only a limited audience, and this stage generally comes late in the dissemination process. From the results of the studies reported here, it seems clear that while information retrieval systems wait for the "public" information, the scientist wishing "up-to-date" findings, does not. During the various stages leading to journal publication, the Author of an article disseminates the main content of his article on a variety of occasions. From the Author's point of view, however, these various reports are not solely for the dissemination of his results. The Author uses reports of his own work to obtain information relevant to his reported work or to work he is presently conducting.

The experienced information-consumer is sensitive to this pre-publication dissemination process (he is usually, of course, an information producer), and he is also trying to discover information about current work relevant to his research. He apparently does not wait to discover this information in a journal or secondary source--he seems to use journals mainly to acquire information he may have

missed during the dissemination process which occurred before journal-article publication.

An important feature of communication in the informal domain is that it brings about genuinely mutual information exchange. This interactive process between information-disseminator and information-consumer and the dual (usually simultaneous) role of the scientist as both a producer and disseminator of information appears characteristic of scientific communication. The results of our studies indicate that geographers spend much time and effort interacting, and that scientific information exchange in the informal domain is, therefore, very effective for them. Any communication innovation which formalizes interaction and lessens the effectiveness and efficiency of mutual exchange among geographers may therefore not be welcomed in the informal domain. A recent innovation in geography, the publication of Proceedings by the AAG (premeeting publication of contributed papers), has been evaluated and found to be an excellent example of an innovation which both formalized some part of an informal medium and simultaneously also increased the effectiveness and efficiency of mutual exchange among geographers.[11]

An examination of the lags in the overall information-flow process for geography reveals a number of critical points which not only confirm the need for improvement of the process, but also identify the loci where such improvement is necessary.

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[11] Nelson, C. E. and Tomita, K. "Impact of the Proceedings on the Annual Meeting of the Association of American Geographers: A Comparison of Scientific Information Exchange at the 1967 and 1969 Annual Meetings." Professional Geographer, 1970, 22, 221-226.

From the time the average Author of an article on geography initiates his work until it is published 31 months has elapsed. It takes him almost twice as long to draft and publish a manuscript (19 months) than to conduct the work (10 months from initiation to completion). During the seven-month period between completion of work and submission of manuscript to a journal, the Author actively disseminates information about his work. Once he submits his manuscript (14 months before its publication), however, he usually refrains from further reporting of it, again suggesting that Authors' prepublication dissemination is mainly to obtain feedback to shape the manuscript for journal publication. Not only is the period between submission and publication of manuscripts extremely long (it constitutes 45% of the time between initiation of work and publication), but it is also rather critical since most Authors cease to report the work because they are involved in new work in the same area as their articles.

This critical period seems in need of innovations which would help to make information potentially available in the informal domain more accessible to the scientific community. First, the publication lag is much too long--the maximum such lag should be less than a year. There are two methods of decreasing publication lag--increasing rejections and expanding the journal. For geography the latter seems preferable since rejection rates are already high and each journal studied publishes relatively few manuscripts in any one year. Second, a list of manuscripts accepted by a journal should be published in the journal before these articles appear. Since three of the journals studied are quarterlies, such a listing would allow interested persons to obtain the information four to eight months sooner. This innovation

would also be helpful in putting scientists on the alert for work to be published soon. Something which seems called for since a number of other workers were unaware that the articles were published at the time of the survey and discovered the article's existence and thereupon read it as a result of the survey.

The study of the usefulness of information published in journal articles on geography was directed at a special class of information users--workers active on the research front associated with the specific subject matter of the articles. The results of the study clearly show that most such workers had gained information, later contained in journal articles useful in their work before such information was published in journals. Those workers who found information in the published article useful were those who had had no earlier contact with the information.

These results raise some questions concerning the function of current journal articles: Can the journal article any longer be regarded as a vehicle which effectively conveys current scientific information? If not, can the journal article be reworked to function in the capacity of integrating scientific information into a larger framework?

Another major problem associated with the process of scientific communication in geography involves the lack of integration of new work into the present body of literature. The data on abstracts, review literature and the age of citations indicate this problem. Geographical Abstracts is neither comprehensive nor timely. Abstracts should be published no later than eight months after the articles' publication and the core journals should be covered fully and

systematically. A possible solution to the problem is for the AAG to cosponsor the abstracts with the present British group now publishing the abstracts. This type of international cooperation has worked well in metallurgy where Metal Abstracts published jointly by the American Society for Metals and the British Institute of Metals has proved highly successful.[12] In addition, all authors should be required to provide abstracts with their submitted manuscripts. These abstracts could then be forwarded to Geographical Abstracts for publication as soon as the article is published. Finally, to further reduce the time lag the abstracts should be published monthly.

There is no review journal or annual volume which regularly publishes review articles in geography. Very rarely one or another of the core journals will publish a review article but this is an extremely haphazard procedure. The lack of a review literature is an extremely serious problem for geography. Review articles recently have taken on increasing importance due to the exponential growth in scientific information. With scientific information growing at this rate, scientists will have either to pack this information into packages they can absorb or drown in it. The AAG must begin to plan ahead for this state of affairs.

The great age of the reference may be due to the fact that geography is a slowly advancing field, but this reason seems unlikely,

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[12]The Johns Hopkins University Center for Research in Scientific Communication. Dissemination and Assimilation of Material Presented in Journals on Metallurgy. JHU-CRSC Report #16. Baltimore, Maryland: Johns Hopkins University Center for Research in Scientific Communication. September, 1970.

since the field is attracting young scientists at an increasing rate. More likely, since there is no review literature, an author has to cite many specific articles when he could, if it existed, have cited just one review article. It seems imperative that the AAG, preferably in cooperation with other professional societies in geography, i.e., the American Geographical Society and the National Council for Geographic Education, put out some review publication. One possible format is that of the Review of Educational Research. Published five times a year by the American Educational Research Association, this journal devotes each issue to one aspect of education, each major area covered once every three years.

In conclusion, the major problems associated with scientific communication in geography seem to originate in the system. That is, it is not the behavior of the geographer which is causing the problems; it is rather features of the system over which he has little control. Clearly, it is the professional society, whose major function is fostering scientific communication, which must attempt to eliminate these problems.

APPENDIX A

COMPARISON OF AUTHORS EMPLOYED WITHIN AND OUTSIDE THE U.S.A.

More than a fourth of the Authors of the 231 articles studied were employed at institutions outside the U.S.A. (hereafter referred to as Foreign Authors); the remaining Authors were employed at U.S. institutions (hereafter referred to as U.S. Authors).

Characteristics of Authors

The two groups exhibited certain similarities in educational background; viz., 82% of the U.S. Authors and 79% of the Foreign Authors held doctorates, 5% of the U.S. Authors having obtained their highest degrees from foreign institutions and 32% of the Foreign Authors from U.S. institutions. The two groups had similar experience in the field, 1963 constituting the median date of highest degree for both groups. More of the Foreign Authors (68% compared to 59% of the U.S. Authors) indicated teaching as their primary activity. Foreign Authors seemed more involved in administration, basic research, applied research, and research guidance. On all other activities no significant differences emerged between the two groups.

Prepublication Schedule of Work Reported in Articles

The nature of the content of the articles was similar for the two groups, 47% of the U.S. Authors and 42% of the Foreign Authors reported that their work was a single field study.

The process from initiation of work to its publication took two months longer for the U.S. Authors even though the time between submission and publication was three months longer for the Foreign Authors. It took Foreign Authors three months less to complete their work. Moreover, the time between completion of work and submission

APPENDIX A (continued)

of the manuscript was two months less for the Foreign Authors.

A similar percentage of both groups (68% of the U.S. Authors and 64% of the Foreign Authors) made some prepublication report of their articles. A similar percentage of both groups made prepublication oral reports; however, more U.S. Authors (50%) than Foreign Authors (39%) made prepublication written reports. Foreign Authors made more presentations at colloquia within their own institutions, while U.S. authors did at local, state or regional meetings. U.S. Authors disseminated their work by means of theses or dissertations more frequently than did Foreign Authors.

The feedback from these prepublication reports seemed more effective for the Foreign Authors, 62% of the Foreign, and 55% of the U.S. Authors making such reports indicated that such reports led them to modify the presentations of their work in the manuscripts submitted for journal publication. Furthermore, more of the modifications involved substantive changes for U.S. Authors than they did for Foreign Authors. Foreign Authors, on the other hand, made relatively more stylistic changes than did U.S. Authors.

A similar percentage of both groups, 42% of the U.S. and 39% of the Foreign Authors, distributed preprints. Of those Authors who distributed preprints, there were differences concerning the basis on which they were distributed. Compared to U.S. Authors, more Foreign Authors distributed preprints to colleagues working in the same area and fewer through institutional mailing lists and to persons who had become familiar with their work earlier and who had requested copies of manuscripts.

APPENDIX A (continued)

More of the Foreign Authors (71%) than the U.S. Authors (62%) who distributed preprints before submission received useful feedback from them. However, for U.S. Authors this feedback more often led to changes in content than for Foreign Authors. For U.S. Authors 47% of the changes involved content while only 34% of the changes for Foreign Authors did so.

Both groups of Authors chose journals in which to publish using the same criteria in all respects.

Continuation of Work in Area of Articles

By the time of publication more Foreign Authors (81%, compared to 65% of the U.S. Authors) had started new work in the same subject-matter area as that treated in their articles. Also, of those conducting work, more of the Foreign Authors' new work evolved directly from some result of the work reported in their published articles. And the new work of the Foreign Authors apparently had progressed further by the time their articles were published--more Foreign Authors had completed this new work, and had already reported it.

APPENDIX B

COMPARISON OF JOURNALS STUDIED WITH REGARD TO CHARACTERISTICS OF AUTHORS AND PUBLISHED MATERIAL

This section of the report examines some similarities and differences in the various journals studied concerning some professional characteristics of the authors, extent of prepublication reports, submission to journals, and the continuity of the work. The first part of this section compares the two journals published by the Association of American Geographers, Annals of AAG (Annals) and Professional Geographer (PG). The last section compares the three other journals studied: Geographical Review (GR), Economic Geography (EC), and Journal of Geography (JG).

Comparison of Annals of AAG with Professional Geographer

Authors of articles in Annals and JG exhibited quite different professional characteristics. Annals Authors manifested the following characteristics: more held doctorates, more had specialized in cultural and historical geography and fewer in biogeography, more had received their highest degrees from a foreign institution, and more were working outside the U.S. More of the Annals Authors reported basic research as their most time-consuming professional activity. In addition, more Annals Authors were involved in basic research, administration, and research guidance. PG Authors, on the other hand, indicated more involvement in applied research, design or developmental work, and studying for an advanced degree.

The nature of the work reported was similar except that more of the PG articles were methodological articles and fewer were reviews. The two journals differed tremendously in the prepublication schedule

APPENDIX B (continued)

of the work reported in their articles. The time between initiation of work and its publication was 20 months longer for the Annals Authors than for PG Authors. Two lags account for 19 months of the period--time to complete work and time between submission and publication of anuscript. While Annals Authors took six months longer to complete the work, it took the Annals 13 months longer to publish it.

More of the Annals Authors made some prepublication report of their work. More of these presented their work at colloquia within their own institutions, in national meetings, international meetings, and in dissertations or theses. However, more PG Authors had presented their work at local, state, or regional meetings. Of those who made prepublication reports, Annals Authors were more likely to have received feedback which led them to modify their manuscripts. Annals Authors more often distributed preprints especially prior to the submission of their manuscripts. They were also more likely to have distributed preprints to persons who had become familiar with their work earlier and who requested copies of the manuscripts. More of the PG Authors who distributed preprints before submission modified their manuscripts as a result of feedback from such distribution. However, more of these modifications were changes in content for Annals Authors.

Although "audience reached by the journal" constituted the major basis for selection of the particular journal publication for both groups, this reason had less importance for PG Authors, who showed greater concern for "speed in publication" and "editorial policy"

APPENDIX B (continued)

than did Annals Authors. More Annals Authors (15%) had received rejections than PG Authors (10%). Moreover, the journals to which these manuscripts had been submitted were different for the two groups. The GR was the journal of previous submission for over half the Annals presubmitted manuscripts, while for PG mansucripts EG and JG each accounted for 25% of the previous submissions. Fewer PG Authors (68%) than Annals Authors (78%) were currently working in the same subject-matter area as that treated in their article. In addition, of those working in the same area, more of the Annals Authors had completed their new work, which is not surprising since they submitted their manuscripts to the Annals on the average a year before the PG Authors and hence had begun their new work a year earlier.

Comparison of Geographical Review, Economic Geography and Journal of Geography

More EG Authors held doctorates, followed by GR Authors and JG Authors in that order. The percentage of highest degrees received from foreign institutions followed the same order: EG Authors the most, JG Authors the least. GR Authors had received their highest degrees on the average 3 to 4 years before the other Authors. The professional activities of GR and EG Authors were similar except that fewer EG Authors indicated basic research as their primary activity and more of them were involved in and indicated applied research as their primary activity. Compared to the other Authors, JG Authors were more involved in studying for an advanced degree, consulting, applied research, and design or developmental work, and less involved in administration, basic research, and research guidance.

APPENDIX B (continued)

More single studies were published in EG than GR, which published more of them than JG. However, for theoretical works the order was reversed--JG published the most and EG the least. The time between initiation of work and its publication was 33 months for EG, 29 months for GR and 24 months for JG. Most of these differences were due to differences in the time between submission and publication which was 17 months for EG, 14 months for GR, and 11 months for JG.

Compared to the other groups, more GR Authors made prepublication reports. More of the GR Authors delivered colloquia both within and outside their own institutions and made international meeting presentations. JG Authors, compared to the other Authors, made fewer presentations at national meetings, prepared fewer technical reports, and had less frequently based their manuscripts on dissertations or theses. Of the Authors who made some prepublication reports, fewer EG Authors received feedback from such reports which led them to modify their manuscripts. Compared to the other groups, more JG Authors made modifications in content. Fewer EG Authors distributed preprints, especially prior to submission and after acceptance. Although more EG Authors modified their manuscripts as the result of distributing preprints, compared to the other groups more of these changes were stylistic.

Although "audience reached by the journal" constituted the major basis for selection of the particular journal for publication for all groups, this reason had less importance for JG Authors. Of any of the groups, EG Authors were more interested in the editorial policy

APPENDIX B (continued)

of the journal while JG Authors showed the least interest in this reason. However, more JG Authors had been invited to submit their manuscripts. Fewer of the GR Authors had submitted their manuscripts to journals which did not publish them. Fewer EG Authors were conducting new work in the subject-matter area as the original articles, while of those so doing fewer JG Authors had based this new work on some aspect of their articles.